

APPENDIX G

The following method QC criteria, equations, and definitions apply to data generated according to the USEPA CLP Statement of Work for Organic Analysis, Low Concentration Water, OLC03.2 - 12/00, Exhibit F Pesticide/Aroclors.

Capillary columns are mandatory. Packed columns cannot be used.

SECTION I: PRESERVATION & HOLDING TIME CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-I-B for preservation and holding time data validation criteria.

SECTION II: GC/ECD INSTRUMENT PERFORMANCE CHECK CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-II-B for GC/ECD Instrument Performance Check data validation criteria and the following method GC/ECD instrument performance QC criteria:

Resolution Check Mixture

A Resolution Check Mixture containing the following analytes must be analyzed at the beginning of the initial calibration sequence. The resolution between two adjacent peaks in the Resolution Check mixture must be greater than or equal to 60.0%.

Analyte	Concentration (ng/mL)
gamma-Chlordane	10.0
Endosulfan I	10.0
4,4'-DDE	20.0
Dieldrin	20.0
Endosulfan sulfate	20.0
Endrin ketone	20.0
Methoxychlor	100.0
Tetrachloro-m-xylene (surrogate)	20.0
Decachlorobiphenyl (surrogate)	20.0

Resolution Check - The % Resolution is calculated using the following equation:

$$\% \text{ Resolution} = \frac{V}{H} \times 100$$

Where,

V = Depth of valley between two peaks. The depth of the valley is measured along a vertical line from the level of the apex of the shorter peak to the floor of the valley between the two peaks.

H = Height of the shorter of the adjacent peaks.

Example

If:

Height of Peak A = 2560

Height of Peak B = 1435

The resolution (depth of the valley) between the two peaks must be at least 60.0% of the shorter peak or Peak B in this situation ($0.6 \times 1435 = 861$). If the resolution between Peak A and Peak B is less than 861, the data will need to be qualified as indicated in Tables Pest/PCB-II-1 and Pest/PCB-II-2.

Performance Evaluation Mixture

A Performance Evaluation Mixture (PEM) containing the analytes listed below must be analyzed at the beginning of the initial calibration sequence, immediately after the Resolution Check Mixture and at the end of the initial calibration sequence. It must also be analyzed once during every 24 hours of the analytical sequence as part of the continuing calibration. The resolution between two adjacent peaks in the PEM must be greater than or equal to 90.0%. The percent breakdown for both DDT and Endrin in each PEM must be less than or equal to 20.0% for both GC columns. The combined percent breakdown for DDT and Endrin in each PEM must be less than or equal to 30.0% for both GC columns.

Analyte	Concentration (ng/mL)
gamma-BHC	10.0
alpha-BHC	10.0
4,4'-DDT	100.0
beta-BHC	10.0
Endrin	50.0
Methoxychlor	250.0
Tetrachloro-m-xylene (surrogate)	20.0
Decachlorobiphenyl (surrogate)	20.0

PERCENT DIFFERENCE (% D) - The % D of the calculated amount (amount found) and the nominal amount (amount added) for each of the single component pesticides and surrogates in the PEM runs of the initial calibration on each GC column must be less than or equal to $\pm 25.0\%$. The % D is calculated using the following equation:

$$\% \text{ Difference} = \frac{C_{calc} - C_{nom}}{C_{nom}} \times 100$$

Where,

C_{calc} = Calculated concentration of each analyte from the analyses of the calibration standard.

C_{nom} = Nominal concentration of each analyte.

4,4'-DDT/ENDRIN BREAKDOWN CALCULATIONS

$$\% \text{ Breakdown DDT} = \frac{\text{Amount found (ng) (DDD + DDE)}}{\text{Amount (ng) of DDT injected}} \times 100$$

$$\% \text{ Breakdown Endrin} = \frac{\text{Amount found (ng) (Endrin Aldehyde + Endrin Ketone)}}{\text{Amount (ng) of Endrin injected}} \times 100$$

$$\text{Combined \% Breakdown} = \% \text{ Breakdown DDT} + \% \text{ Breakdown Endrin}$$

SECTION III: INITIAL CALIBRATION CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-III-B for initial calibration data validation criteria and the following method initial calibration QC criteria:

Each GC/ECD system must be initially calibrated using the following sequence.

INITIAL CALIBRATION SEQUENCE

1. Resolution Check
2. Performance Evaluation Mixture
3. Aroclor 1016/1260
4. Aroclor 1221
5. Aroclor 1232
6. Aroclor 1242
7. Aroclor 1248
8. Aroclor 1254
9. Toxaphene
10. Low Point Standard A
11. Low Point Standard B
12. Midpoint Standard A
13. Midpoint Standard B
14. High Point Standard A
15. High Point Standard B
16. Instrument Blank
17. Performance Evaluation Mixture

Table App.G.III-1 - ANALYTES CONTAINED IN INDIVIDUAL STANDARD MIXTURE A AND INDIVIDUAL STANDARD MIXTURE B

<u>IND STD MIXTURE A</u>	<u>LOW POINT CONCENTRATION (ng/mL)</u>
alpha-BHC	5.0
Heptachlor	5.0
gamma-BHC	5.0
Endosulfan I	5.0
Dieldrin	10.0
Endrin	10.0

4,4'-DDD	10.0
4,4'-DDT	10.0
Methoxychlor	50.0
Tetrachloro-m-xylene (surrogate)	5.0
Decachlorobiphenyl (surrogate)	10.0

IND STD MIXTURE BLOW POINT CONCENTRATION (ng/mL)

beta-BHC	5.0
delta-BHC	5.0
Aldrin	5.0
Heptachlor epoxide*	5.0
alpha-Chlordane	5.0
gamma-Chlordane	5.0
4,4'-DDE	10.0
Endosulfan sulfate	10.0
Endrin aldehyde	10.0
Endrin ketone	10.0
Endosulfan II	10.0
Tetrachloro-m-xylene (surrogate)	5.0
Decachlorobiphenyl (surrogate)	10.0

*Note: Only the exo-epoxy isomer (isomer B) of heptachlor epoxide is used as an analytical standard.

Table App.G.III-2 - MULTICOMPONENT ANALYTE LOW POINT CONCENTRATIONSMULTICOMPONENT ANALYTESLOW POINT CONCENTRATIONS (ng/mL)

Aroclor 1016	100
Aroclor 1221	200
Aroclor 1232	100
Aroclor 1242	100
Aroclor 1248	100
Aroclor 1254	100
Aroclor 1260	100
Toxaphene	500

Multicomponent standards including the Aroclors and Toxaphene must be prepared individually except for Aroclor 1260 and Aroclor 1016 which may be combined in one standard mixture.

RETENTION TIME WINDOW CALCULATION

In the initial calibration the absolute retention times (RTs) are measured for all single component pesticides, the surrogates, and at least three major peaks of each multicomponent analyte. The mean RTs for single component standards and surrogates are calculated as the average of the three values and the RTs for multicomponent analytes are based on one value.

A retention time window for each single component pesticide and surrogate, and for the major peaks (3 to 5) of each multicomponent analyte are calculated using the values in Table App.G.III-3.

The mean absolute retention time (\overline{RT}) is calculated according to the following equation:

$$\overline{RT} = \frac{\sum_{i=1}^n RT_i}{n}$$

Where,

\overline{RT} = Mean absolute retention time of analyte.
 RT_i = Absolute retention time of analyte.
 n = Number of measurements (3).

Example

The retention time window is calculated by first taking the mean of the retention times from the low, mid, and high concentration of the individual standards in the initial calibration. For example, the retention times for Endrin are:

Low - 9.86 minutes Mid - 9.85 minutes High - 9.86 minutes

Mean = 9.86 minutes

Since we know from Table App.G.III-3 that the retention time window for Endrin is ± 0.07 , we add and subtract 0.07 to and from the Mean to calculate the retention time window for Endrin from the initial calibration.

RT Window for Endrin = 9.79 - 9.93 minutes

Table App.G.III-3 - RETENTION TIME WINDOWS FOR ANALYTES AND SURROGATES

Analyte	Retention Time Window in Minutes
alpha-BHC	± 0.05
beta-BHC	± 0.05
gamma-BHC	± 0.05
delta-BHC	± 0.05
Heptachlor	± 0.05
Aldrin	± 0.05
alpha-Chlordane	± 0.07
gamma-Chlordane	± 0.07
Heptachlor Epoxide	± 0.07
Dieldrin	± 0.07

Analyte	Retention Time Window in Minutes
Endrin	±0.07
Endrin Aldehyde	±0.07
Endrin Ketone	±0.07
DDD	±0.07
DDE	±0.07
DDT	±0.07
Endosulfan I	±0.07
Endosulfan II	±0.07
Endosulfan Sulfate	±0.07
Methoxychlor	±0.07
Aroclors	±0.07
Toxaphene	±0.07
Tetrachloro-m-xylene	±0.05
Decachlorobiphenyl	±0.10

CALIBRATION FACTOR CALCULATION

In the initial calibration, peak areas or peak heights are measure to determine the analyte calibration factor (CF). The calibration factor for each single component pesticide and surrogate and for each peak in the selected set of 3 to 5 major peaks for each multicomponent analyte is calculated using equation III-1. The mean CF for each single component pesticide and surrogate is calculated using equation III-2. **Note: The single component pesticide mean CF is only used in calculating the % RSD and not for quantifying sample results.**

Equation III-1:

$$CF = \frac{\text{Peak Area (height) of the standard}}{\text{Mass injected (ng)}}$$

Equation III-2:

$$\overline{CF} = \frac{\sum_{i=1}^n CF_i}{n}$$

Where,

CF_i = Calibration factor.

\overline{CF} = Mean calibration factor.

n = Total number of values (3).

% RSD CALCULATION

Initial calibration data is used to assess the linearity of each GC/ECD system used for sample analysis. The linearity of the GC is assessed by calculating a % RSD of the calibration factors for each single component pesticide and surrogate using equation III-3.

Equation III-3:

The % RSD is calculated using the following equation:

$$\% RSD = \frac{SD_{CF}}{\overline{CF}} \times 100$$

Where,

$$SD_{CF} = \sqrt{\frac{\sum_{i=1}^n (CF_i - \overline{CF})^2}{(n-1)}}$$

% RSD = Percent relative standard deviation.

SD_{CF} = Standard deviation of calibration factors.

CF_i = Each individual Calibration Factor used to calculate the mean.

\overline{CF} = Mean calibration factor.

n = Total number of values (3).

SECTION IV: CONTINUING CALIBRATION CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-IV-B for continuing calibration data validation criteria and the following method continuing calibration QC criteria:

The analyses of the instrument blanks, Performance Evaluation Mixtures (PEM), and the midpoint concentration of Individual Standard Mixtures A and B constitute the continuing calibration. Sample data are not acceptable unless bracketed by acceptable analyses of instrument blanks, PEM, and both Individual Standard Mixtures A and B. A valid analysis sequence is given below:

1. Sequence

Time	Injection #	Material Injected
	1 - 15	First 15 steps of the Initial Calibration
0 hr.	16	Instrument Blank* at the end of the Initial Calibration
	17	PEM at the end of the Initial Calibration
	18	First Sample
	o	
	o	Subsequent Samples
	o	
12 hr.	o	Last Sample
	1st injection past 12:00 hr.	Instrument Blank*
	2nd and 3rd injections past 12:00 hr.	Individual Standard Mixtures A and B
	o	Sample
	o	
	o	Subsequent Samples
	o	
Another 12 hr.	o	Last Sample
	1st injection past 12:00 hr.	Instrument Blank*
	2nd injection past 12:00 hr.	Performance Evaluation Mixture
	o	Sample
	o	
	o	Subsequent Samples
	o	
Another 12 hr.	o	Last Sample
	1st injection past 12:00 hr.	Instrument Blank*
	2nd and 3rd injections past 12:00 hr.	Individual Standard Mixtures A and B
	o	Sample
	o	
	o	Subsequent Samples
	etc.	

*The instrument blank contains only the surrogate analytes: Tetrachloro-m-xylene and Decachlorobiphenyl.

PERCENT DIFFERENCE (%D) - The %D of the calculated amount (amount found) and the nominal amount (amount added) for each of the single component pesticides and surrogates in the PEM and Individual Mixture runs of the continuing calibration on each GC column must be less than or equal to $\pm 25.0\%$. The %D is calculated using the following equation:

$$\%D = \frac{C_{calc} - C_{nom}}{C_{nom}} \times 100$$

Where,

C_{calc} = Calculated concentration of each analyte from the analyses of the standard.

C_{nom} = Nominal concentration of each analyte.

Example

The nominal amount of gamma-BHC added to the PEM is 10 ng/mL. The calculated amount of gamma-BHC is found to be 12 ng/mL. Using the above equation, the percent difference is calculated as follows:

$$\%D = \frac{12 - 10}{10} \times 100 = 20\%$$

Example

The nominal amount of 4,4'-DDT added to the INDA is 10 ng/mL. The calculated amount of 4,4'-DDT is found to be 9.0 ng/mL. Using the above equation, the percent difference is calculated as follows:

$$\%D = \frac{9.0 - 10}{10} \times 100 = -10\%$$

Example

The nominal amount of Aldrin added to the INDB is 5.0 ng/mL. The calculated amount of Aldrin is found to be 7.0 ng/mL. Using the above equation, the percent difference is calculated as follows:

$$\%D = \frac{7.0 - 5.0}{5.0} \times 100 = 40\%$$

SECTION V: BLANK CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-V-B for blank data validation criteria and the following method QC criteria.

Method Required Blanks

1. Method Blank - A volume of reagent water or purified solid matrix, approximate in weight or volume to the samples, which is carried through the entire analytical process to determine the levels of contamination associated with the processing and analysis of the entire set of samples. Surrogate analytes must recover between 30-150%. A method blank must be extracted and analyzed once per each SDG, or each extraction procedure within an SDG, or whenever samples are extracted, whichever is most frequent.
2. Sulfur Cleanup The sulfur cleanup blank is a modified form of the method blank. It is a volume of clean solvent spiked with the surrogates and carried through the sulfur cleanup and analysis procedures. This blank is used to determine the levels of contamination associated with the separate sulfur cleanup steps. Surrogate analytes must recover between 30-150%. The sulfur cleanup blank is prepared separately when only part of a set of samples extracted together requires sulfur removal. If all of the samples associated with a given method blank require sulfur cleanup, then the method blank must be subjected to sulfur cleanup and no separate sulfur cleanup blank is required.

3. Instrument Blank - The instrument blank is a volume of clean solvent spiked with the surrogates and analyzed on each GC column and instrument used for sample analysis. The purpose of the instrument blank is to determine the levels of contamination associated with the instrument analysis itself, such as the carry-over of analytes from standard or highly contaminated samples into other analyses. An instrument blank must be analyzed after a sample whose concentration exceeds the calibration range. Until an instrument blank meets the technical acceptance criteria, the system is considered contaminated.

A GPC blank, a type of instrument blank, is analyzed after the initial calibration of GPC. It is not spiked with surrogate analytes.

SECTION VI: SURROGATE ANALYTE CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-VI-B for surrogate analyte data validation criteria and the following method surrogate analyte QC criteria:

Table App.G.VI-1 - SURROGATE RETENTION TIME WINDOWS

Surrogate	Retention Time Window in Minutes
Tetrachloro-m-xylene	±0.05
Decachlorobiphenyl	±0.10

The % surrogate recovery is calculated using the following equation:

$$\text{Surrogate Percent Recovery} = \frac{Q_d}{Q_a} \times 100\%$$

Q_d = Quantity of surrogate determined by analysis.

Q_a = Quantity of surrogate added to sample/blank.

Table App.G.VI-2 - SURROGATE SPIKE RECOVERIES

Surrogate	Percent Recovery (Water)
Tetrachloro-m-xylene	30-150
Decachlorobiphenyl	30-150

*Pesticide surrogate analyte recoveries are mandatory for samples and blanks in the Low Concentration method.

SECTION VII: PESTICIDE CLEANUP CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-VII-B for pesticide cleanup data validation criteria and the following method pesticide cleanup QC criteria:

Florisil Cartridge

The Florisil Cartridge Performance Check consists of testing every lot of Florisil prior to use by analyzing the following two solutions in a mixture.

1. The Florisil Cartridge Check Solution contains 2,4,5-trichlorophenol in acetone, at a concentration of 0.10 ug/mL.
2. The Pesticide Spiking Solution contains the following Standard Mixture A analytes at the midpoint concentration:

alpha-BHC	4,4'-DDD
heptachlor	4,4'-DDT
gamma-BHC	methoxychlor
endosulfan I	tetrachloro-m-xylene
dieldrin	decachlorobiphenyl
endrin	

Table App.G.VII-1 - FLORISIL CARTRIDGE PERFORMANCE CHECK CRITERIA

INDA Analyte % Recovery	80% - 120%
2,4,5-TCP Recovery	2,4,5-Trichlorophenol must recover at < 5.0%
Other Target Analytes	No interfering peaks with the target analytes

Sulfur Cleanup

Sulfur cleanup must be performed on all extracts containing sulfur at levels that interfere with GC/ECD analysis. Sulfur contamination in a sample analysis is unacceptable. A sulfur cleanup blank is required even if only a part of a set of samples requires sulfur cleanup.

1. Sulfur cleanup can be performed using two techniques: the Mercury Technique or the Copper Technique.
2. The method blank must be subjected to the same cleanup procedure as the samples.

SECTION VIII: MATRIX SPIKE/MATRIX SPIKE DUPLICATE CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-VIII-B for MS/MSD data validation criteria and the following method MS/MSD QC criteria:

A matrix spike and matrix spike duplicate must be performed if requested on the traffic report, at a frequency of each group of 20 field samples in an SDG, or each SDG, whichever is more frequent.

The following advisory matrix spike analyte recoveries and RPDs are listed below:

Table App.G.VIII-1 - MATRIX SPIKE RECOVERY AND RELATIVE PERCENT DIFFERENCE LIMITS

Analyte	Method QC Criteria	
	% Recovery*	RPD**
gamma-BHC (Lindane)	56-123	15
Heptachlor	40-131	20
Aldrin	40-120	22
Dieldrin	52-126	18
Endrin	56-121	21
4,4'-DDT	38-127	27

*The MS/MSD % recovery is calculated using the following equation:

$$\text{Matrix Spike Recovery} = \frac{SSR - SR}{SA} \times 100$$

Where,

SSR = Spike Sample Result.

SR = Sample Result.

SA = Spike Added.

**The MS/MSD relative percent difference (RPD) is calculated using the following equation:

$$\text{Relative Percent Difference} = \frac{|MSR - MSDR|}{1/2 (MSR + MSDR)} \times 100$$

Where,

MSR = Matrix Spike Recovery.

MSDR = Matrix Spike Duplicate Recovery.

Note: The vertical bars in the formula above indicate the absolute value of the difference, hence RPD is always positive.

SECTION IX: FIELD DUPLICATE CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-IX-B for field duplicate data validation criteria.

SECTION X: SENSITIVITY CHECK CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-X-B for sensitivity check data validation criteria.

SECTION XI: PE SAMPLES - ACCURACY CHECK CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-XI-B for accuracy check data validation criteria and the following method accuracy check QC criteria:

The Laboratory Control Sample is a method required internal laboratory quality control sample that must be prepared, analyzed, and reported once per SDG. It must be prepared and analyzed concurrently with the samples in the SDG using the same instrumentation as the samples.

Table App.G.XI-1 - LCS % RECOVERY LIMITS

Analyte	Method Required QC % Recovery Limits for LCS (Water)
gamma-BHC (Lindane)	50-120
Heptachlor epoxide	50-150
4,4'-DDE	50-150
Dieldrin	30-130
Endrin	50-120

Endosulfan sulfate	50-120
gamma-Chlordane	30-130

PERCENT RECOVERY CALCULATIONS

The LCS % recovery is calculated using the following equation:

$$LCS \text{ Percent Recovery} = \frac{Q_d}{Q_a} \times 100\%$$

Q_d = Quantity of LCS determined by analysis.

Q_a = Quantity of LCS added to the blank.

SECTION XII: TARGET ANALYTE IDENTIFICATION CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-XII-B for target analyte identification data validation criteria.

SECTION XIII: ANALYTE QUANTITATION AND REPORTED QUANTITATION LIMIT CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-XIII-B for analyte quantitation and reported quantitation limit data validation criteria and the following method quantitation QC criteria:

Pesticide/PCB analytes must be quantified using the external standard method. The midpoint Calibration Factor from the most recent compliant initial calibration must be used to quantify sample single component pesticides on both columns and the lowest sample concentration must be reported. For multicomponent analytes the calibration factors for three to five major peaks from the most recent compliant initial calibration are each used to quantify the multicomponent analyte in the sample. The three to five concentrations are then averaged and then a mean concentration for the sample analyte is determined on each column. The lowest mean concentration is reported. Pesticide/PCBs must be reported to the CRQLs listed below:

**Table App.G.XIII-1 - TARGET COMPOUND LIST (TCL) AND CONTRACT REQUIRED
QUANTITATION LIMITS (CRQLs)**

Pesticides/Aroclors	CAS Number	Quantitation Limits
		Water ug/L
alpha-BHC	319-84-6	0.01
beta-BHC	319-85-7	0.01
delta-BHC	319-86-8	0.01
gamma-BHC	58-89-9	0.01
Heptachlor	76-44-8	0.01
Aldrin	309-00-2	0.01
Heptachlor epoxide	1024-57-3	0.01

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Endosulfan I	959-98-8	0.01
Dieldrin	60-57-1	0.02
4,4'-DDE	72-55-9	0.02
Endrin	72-20-8	0.02
Endosulfan II	33213-65-9	0.02
4,4'-DDD	72-54-8	0.02
Endosulfan sulfate	1031-07-8	0.02
4,4'-DDT	50-29-3	0.02
Methoxychlor	72-43-5	0.10
Endrin ketone	53494-70-5	0.02
Endrin aldehyde	7421-93-4	0.02
alpha-Chlordane	5103-71-9	0.01
gamma-Chlordane	5103-74-2	0.01
Toxaphene	8001-35-2	1.0
Aroclor-1016	12674-11-2	0.2
Aroclor-1221	11104-28-2	0.4
Aroclor-1232	11141-16-5	0.2
Aroclor-1242	53469-21-9	0.2
Aroclor-1248	12672-29-6	0.2
Aroclor-1254	11097-69-1	0.2
Aroclor-1260	11096-82-5	0.2

SAMPLE CONCENTRATION - Concentrations of single component pesticides and surrogates are calculated for both GC columns using the CF from the initial calibration for the midpoint concentration of the external calibration standard in the following equations:

Sample concentrations for waters:

$$ug/L = \frac{(A_x) (DF) (V_t)}{(CF) (V_i) (V_x)}$$

Where,

- A_x = Area of peak for the analyte being measured.
- CF = Calibration Factor for the midpoint concentration from the initial calibration (area per ng).
- V_t = Volume of total extract in microliters (uL).
- V_i = Volume of extract injected in microliters (uL).
- V_x = Volume of sample extracted in milliliters (mL).
- DF = Dilution Factor - The dilution factor for analysis of water samples by this method is defined as follows:

$$\frac{\text{uL most conc. extract used to make dilution} + \text{uL clean solvent}}{\text{uL most conc. extract used to make dilution}}$$

If no dilution is performed, DF = 1.

Adjusted CRQL = Non-adjusted CRQL x Sample Dilution Factor

$$\text{Adjusted}_{\text{CRQL}} = \text{Contract}_{\text{CRQL}} \times \frac{\text{Contract Sample Vol (1000mL)}}{V_x} \times DF \times \frac{V_t}{\text{Contract Ext. Vol (2000uL)}}$$

Where,

V_t = Volume of total extract in microliters (2000 uL).

DF = Dilution Factor.

V_x = Volume of water extracted in milliliters (mL).

For example, the adjusted CRQL for a water sample with a 1.0U non-diluted CRQL and a 1 to 100 dilution (100 dilution factor) would be 100U, according to the following equation:

$$100\text{U} = 1.0\text{U} \times 100$$

PERCENT DIFFERENCE CALCULATION

The lower of the two concentrations calculated for each single component pesticide is reported on the tabulated report Form I. For multicomponent analytes the lower mean concentration is reported. The percent difference between the two values is reported on Form X and calculated using the following equation:

$$\%D = \frac{C_h - C_l}{C_l} \times 100$$

Where,

C_h = The higher of the two concentrations for the target analyte in question.

C_l = The lower of the two concentrations for the target analyte in question.

SECTION XIV: SYSTEM PERFORMANCE CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-XIV-B for system performance data validation criteria.

SECTION XV: OVERALL ASSESSMENT CRITERIA

Refer to Region I, EPA-NE Data Validation Functional Guidelines for Evaluating Environmental Analyses, Part III, Section PEST/PCB-XV-B for overall assessment data validation criteria.